FOREWORD

Solar and stellar photospheres constitute the layers most accessible to observations, forming the interface between the interior and the outside of the stars. The solar atmosphere is a rich physics laboratory, in which the whole spectrum of radiative, dynamical, and magnetic processes that tranfer energy into space can be observed. As the fundamental processes take place on very small spatial scales, we need high-resolution observations to explore them. On the other hand the small-scale processes act together to form global properties of the sun, which have their origins in the solar interior. The rapid advances in observational techniques and theoretical modelling over the past decade made it very timely to bring together scientists from east and west to the first IAU Symposium on this topic.

The physics of the photosphere involves complicated interactions between magnetic fields, convection, waves, and radiation. During the past decade our understanding of these generally small-scale structures and processes has been dramatically advanced. New instrumentations, on ground and in space, have given us new means to study the granular convection. Diagnostic methods in Stokes polarimetry have allowed us to go beyond the limitations of spatial resolution to explore the structure and dynamics of the subarcsec magnetic structures. Extensive numerical simulations of the interaction between convection and magnetic fields using powerful supercomputers are providing deepened physical insight. Granulation, magnetic fields, and dynamo processes are being explored in the photospheres of other stars, guided by our improved understanding of the solar photosphere.

Not only are we beginning to understand the relation between the small-scale processes and the large-scale structures, but it is also becoming increasingly clear that the sun cannot be properly separated into a "quiet" and an "active" part. The sun (and other stars for that matter) should rather be looked upon as a complicated but indivisible organism, whose numerous and interrelated properties exhibit both cyclic and secular variations, on short as well as long time scales. The symposium has considered the photosphere of the sun within this broader context, as an integral part of a larger system.

The symposium took place in Kiev, USSR, May 15-20, 1989, and was attended by more than 200 participants from 24 countries. The presentations included 20 invited review papers, 37 orally contributed papers, and more than 100 poster papers. The meeting was sponsored by IAU Commission 12 and cosponsored by Commissions 10 and 36. We are grateful for the travel support provided by the IAU and by the Academy of Sciences of the Ukrainian SSR.

The Scientific Organizing Committee consisted of V. Bumba, C.J. Durrant, D.F. Gray, E.A. Gurtovenko, R. Howard, V.N. Karpinsky, R. Muller, Å. Nordlund, R.W. Noyes, R.J. Rutten, H.C. Spruit, J.O. Stenflo (Chairman), H. Yoshimura, and C. Zwaan. I am grateful to the SOC members for their support. In particular I am indebted to Rob Rutten, who was one of the originators of the idea of having this type of a symposium in Kiev, and who has provided an important link between SOC and the organizers in Kiev.

The Local Organizing Committee had the following members: V.V. Botvinova, E.A. Gurtovenko (Chairman), E.V. Kononovich, R.I. Kostik, V.N. Krivodubsky, V.N. Obridko, S.N. Osipov, N.G. Shchukina, V.A. Sheminova, Y.L. Spirin. The local organization was a great success, and the meeting was characterized by an open, cordial, and stimulating atmosphere, which allowed for the development of many new scientific contacts and friendships. It is a great pleasure to express our thanks to the LOC Chairman, Ernest Gurtovenko, to Roman Kostik and the other members of the Main Astronomical Observatory, and to the observatory director, Yaroslav Yatskiv, for all hospitality shown to us. The excellent conference facilities at the Trade House in Kiev, with simultaneous translation between English and Russian, further contributed to the success of the symposium.

During the meeting it was decided to speak out on one of the most important issues of our time — the militarization of space. A letter with an appeal to President G. Bush and President M. Gorbachev to take every pertinent measure to prevent that outer space will become a base for placing nuclear or other weapons was endorsed by acclamation by the symposium participants. The letter also expresses concern about atmospheric and space pollution with nuclear waste and radiation, which threatens life on our planet and will make it more and more impossible to explore the universe by astronomical observations.

The proceedings have been prepared from camera-ready manuscripts. In the case of a number of papers, mainly those by Soviet authors, it was necessary to make extensive language corrections and to retype the entire manuscripts, without changing anything of the scientific contents. I am responsible for any errors that may have been introduced in this process. It is finally a pleasure to express my sincere thanks to Mrs. S. Weber and Mrs. M. Szigeti of the Institute of Astronomy of the ETH Zurich for their very extensive secretarial assistance in the preparation of these proceedings.

Zurich, August 1989 Jan Olof Stenflo